African Journal of Biotechnology Vol. 7 (20), pp. 3683-3685, 20 October, 2008
Available online at http://www.academicjournals.org/AJB
DOI: 10.5897/AJB08.472
ISSN 1684–5315 © 2008 Academic Journals

Short Communication

Efficacy of certain plant extracts against seed-borne infection of *Collectotrichum destructivum* on cowpea (*Vigna uniguculata*)

Akinbode O. A.[1] and Ikotun T.[2]

[1]Institute of Agricultural Research and Training, IAR and T, Ibadan, Nigeria.
[2]Department of Crop Protection and Environmental Biology, University of Ibadan, Nigeria.

Accepted 15 August, 2008

Aqueous extracts of leaves of *Moringa oleifera* Lam, *Vernonia amygdalina* and *Annona muricata* were evaluated for the control of *Collectotrichum destructivum* on seeds of cowpea (*Vigna uniguculata*). The seeds were soaked in sterile distilled water extract (10, 20 and 30%, w/v) of the leaves for 6, 12 and 18 h. All these plant extracts had significant inhibitory growth effect on the fungal pathogen. *M. oleifera* extract was more effective than other plant extracts and compared favorably with benomyl in the control of the pathogen.

Key words: Benomyl, *Collectotrichum destructivum*, leaves extracts, *Vigna uniguculata.*

INTRODUCTION

Cowpea (*Vigna uniguculata* L. Walp) is a host of many seed-borne pathogens including *Collectotrichum destructivum* O' Gara (Allen et al., 1998). The fungus is found worldwide, attacking and inducing diseases on many parts of the plant. *C. destructivum,* being predominant and prevalent on cowpea plants and seeds in south-western Nigeria, has been reported to cause necrotic flecks or lesions on the girdle stem, penducles and petioles (Emechebe and Shoyinka, 1985). Losses due to this disease are attributed to reduced viability, poor plant performance, and reduced yield due to pod infections. Since the fungus is seed borne (Amusa et al., 1994), control of seed borne infection would be a possible means of reducing losses due to this disease. The degree of infection by *C. destructivum* was reduced to some extent by seed treatment with benomyl. Nevertheless, this kind of chemical control of disease has several disadvantages and it is neither environmentally safe nor friendly. The use of alternative biocontrol option is more preferable whenever possible. The antifungal properties of some plant extracts were investigated with the aim of finding alternatives to the use of chemicals.

*Corresponding author. E-mail: foyedeji@yahoo.com.

MATERIALS AND METHODS

Fresh leaves of *Annona muricata, Moringa oleifera* and *Vernonia amydalina* were washed and separately ground in blender with distilled water. The solutions were allowed to stand overnight and were strained through a clean muslin cloth. These were centrifuged at 1000 rpm for 15 min. Three concentrations were prepared by extracting 10, 20 and 30 g of plant extracts in 100 ml of sterile distilled water. The seeds, with high infection by *C. destructivum* as determined by the blotter method, were treated with each of the extracts treatment involving soaking the seeds in each of the concentration for 6, 12 and 18 h. Treated seeds were dried on blotter sheets for 8 – 10 h and subjected to blotter test. Seeds were also soaked in 3.0% benomyl for 30 min and untreated seeds served as control. For each treatment, four replicates of 25 seeds each were considered making a total of 100 seeds for each treatment. Observation for the incidence of *C. destructivum* was made under microscope. Cultures and slides were compared with standards obtained from Institute of Agricultural Research and Training (IAR and T), Ibadan. The data on average incidence of *C. destructivum* were subjected to ANOVA and means were separated using the Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

All the three concentrations of the plant extracts at different time of exposure (soaking hours) reduced the incidence of *C. destructivum*. Complete control was ob-

Table 1. Effect of different plant extracts on seed-borne *C. destructivum*.

Concentration (%)	Exposure time (h)	Average pathogen incidence[o]		
		Moringa oleifera	***Annona muricata***	***Vernonia amygdalina***
Control		65.6a*	65.6a	65.6a
10	6	32.6	42.9	48.6
	12	24.7	31.4	27.4
	18	21.2	18.6	16.5
20	6	11.6	10.7	12.1
	12	7.8	6.9	6.5
	18	0.5	4.0	0.8
30	6	0.0	1.8	2.0
	12	0.1	0.0	0.0
	18	0.0	0.0	0.0

*Values are percentage incidence of *C. destructivum* subjected to square root transformation, and values in the same column followed by the same letters are not significantly different (p ≥ 0.05 LSD).
[o]Based on four replicates of 25 seeds each.

Table 2. Comparison of effect of different plant extracts and fungicide (benomyl) on the incidence of seed-borne *C.destructivum*.

Treatment**	Average pathogen incidence[o]
Untreated seeds in water	65.6a**
Moringa oleifera	0.0
Annona muricata	0.0
Vernonia amygdalina	3.2
Benomyl (3%)	0.8

*Values are percentage incidence of *C. destructivum* subjected to square root transformation, and values in the same column followed by the same letters are not significantly different (p ≥ 0.05 LSD).
**Concentration of 20% (w/v) and soaking 18 h for all plant extracts.
[o]Based on 10 replicates of 40 seeds each.

tained with *M. oleifera* using 20 and 30% extracts at 18 h soaking period. There were significant differences in the incidence of *C. destructivum* on seed treated with the different concentrations of the extracts of *A. muricata* and at different time of exposure, soaking periods. The incidence of the pathogen was reduced significantly to 18.6% on cowpea seeds treated with 10% extracts for 18 h. Complete control was achieved by treating cowpea seeds with 20 and 30% extract soaked for 18 and 12 h, respectively (Table 1).

Leaf extracts of *M. oleifera* considerably reduced the fungal incidence to 7.8 and 0.5% in 20% extract after soaking for 12 and 18 h, respectively. The crude extracts from *V. amygdalina* did not completely reduce the incidence of the fungus. However at higher concentrations, a considerable and significant reduction in the incidence of the pathogen was obtained.

A comparison between the effect of all the plant extracts at 20% concentration (soaking period of 18 h) and benomyl (a standard fungicide), indicated that the extracts from *M. oleifera* and *A. muricata* were superior to the fungicide in achieving disease control in that they completely inhibited the growth of the fungus than the fungicide at 3% concentration and 30 min soaking (Table 2). Most botanical pesticides are known to be general bio-cides or bio-irritants (White, 2004). *M. oleifera* has been used as medicinal treatment for human urinary problem (HDRA, 2002) and found to possess bactericidal properties. An *in vitro* study showed that an aqueous extracts from seeds and leaves showed positive inhibition on *Basidiobolus haptosporus* and S*taphylococcus aureus* (Medical Pharmacopoeia, 1999). *Moringa* leaves buried into soil before planting prevented damping off disease among seedlings (HDRA, 2002). The *in vitro* anti-fungal effects of the *M. oleifera* extract compared favorably with the effects of some conventional drugs used to treat zygomycotic infections.

In this study, the plant extracts exhibited anti-fungal activity which varies with varied degrees of concentration and time of exposure to the seeds. Aqueous extracts from leaves of *M. oleifera* proved to be more effective in this study against *C. destructivum*. No work has been reported on the fungitoxicity of this plant extract on fungus but it has been observed to serve as a coagulant to clean dirty water and used for human health problems in Nigeria. The extracts of leaves of *A. muricata* also significantly reduced the incidence of *C. destructivum*. This agrees with the work of Oluwole (2005) that reduction in fungi growth can be achieved with this plant. The extracts from leaves of *V. amygadalina* were reported by (Enikuomehin) 1994 to control seed myco-flora of wheat in storage. Results also showed that *M. oleifera* and *A. muricata* can effectively be used against seed-borne fungus of cowpea, *C. destructivum*.

ACKNOWLEDGEMENTS

We wish to acknowledge the technical assistance of Mr.

O.S. Salako (of blessed memory) of the Department of Crop protection and Environmental Biology, University of Ibadan. Also, we appreciate Mr. O. F Owolade of the Institute of Agricultural Research and Training, IAR and T, Ibadan, Nigeria for helping out in the field identification.

REFERENCES

Allen DJ, Thotappilly G, Emechebe AM, Singh BB (1998). Diseases of Cowpea. In: the pathology of food and pasture legumes. Allen DJ, Lenne JM (ed). Cab international in association with ICRISAT. 750p.

Amusa NA, Ikotun T, Osikanlu YOK (1994). Screening Cowpea and Soybean cultivars for resistance to anthracnose and Brown blotch diseases using Phytotoxic metabolites. Afr. Crop Sci. J 2(2): 22-224.

Emechebe AM, Shoyinka SA (1985). Fungal and bacteria disease of cowpea in Africa. In Cowpea Research, production and utilization. Ed by Singh SR, Rachie KO. John Wiley and Son Ltd. pp. 173-192.

Enikuomehin OA (1994). Field diseases and seed-borne mycoflora of rainfed wheat (*Triticum arstivum* L.) in Ibadan. Unpublished PhD, University of Ibadan, Nigeria.

HDRA (2002). *Moringa oleifera*, a Multipurpose Tree, p. 14.

Oluwole AO (2005). Comparative effects of varied concentrations of extracts of different parts of *Moringa oleifera* Lam and *Annona muricata* on some fungal pathogens. Unpublished B.Sc Thesis, University of Ibadan, Ibadan, Nigeria.

Medical Pharmacopoeia (1999). Moringa oleifera, the Miracle Tree.

White DA (2004). Organic and natural pest control. Retrieved online www.atelier2000.com/organic.htm.